



# ASPARAGUS

Its Planting • Care • Management

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# Asparagus: Its Planting, Care, and Management

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ASPARAGUS-GROWING has become an increasingly important industry within the last few years. Wider understanding by consumers of food needs, better growing and marketing methods, and improved methods of merchandising have all had their effect in increasing the consumption of fresh green asparagus, along with many other vegetables such as spinach, head lettuce, snap beans, and carrots.

In the last few years Illinois has become one of the leading asparagus-canning states, being second only to California (Table 1). This demand for asparagus for canning has led to heavy plantings, and to the need for more information about methods of planting, care, and marketing. This circular is designed to fill that need.

TABLE 1.—CASES OF GREEN ASPARAGUS CANNED IN 1936 AND 1937<sup>a</sup>

State	1936	1937	State	1936	1937
California.....	496 370	568 807	Michigan.....	69 408	83 257
Illinois.....	110 212	222 268	Washington.....	36 580	37 599
New Jersey.....	83 093	111 316	All others.....	126 188	167 022

<sup>a</sup>Compiled by National Cannery Association.

The large plantings now found in Illinois for canning were all started within the last fifteen years. A great impetus was supplied by the sudden and vigorous competition that arose in 1934 among the canneries of the state for the product of every available acre. A large part of the asparagus which had previously gone to the fresh market was sold to the canners.

Most of the new asparagus plantings from 1934 to 1939 in Illinois were made on cannery-owned farms, but there was also much planting by experienced growers and by new planters. During this same period several hundred acres of old, exhausted beds were plowed up in southern Illinois; so while total acreage was expanded very little (see Table 2), total potential yield was greatly increased.

Plantings have also been expanded in several other states, notably

TABLE 2.—ACREAGE OF ASPARAGUS HARVESTED IN ILLINOIS, 1929-1939<sup>a</sup>

Year	For shipping	For processing	Total
	<i>acres</i>	<i>acres</i>	<i>acres</i>
1929.....	3 670	530	4 200
1930.....	3 880	620	4 500
1931.....	4 000	700	4 700
1932.....	4 210	890	5 100
1933.....	4 330	970	5 300
1934.....	4 120	1 080	5 200
1935.....	3 790	1 210	5 000
1936.....	3 000	2 100	5 100
1937.....	2 570	2 830	5 400
1938.....	2 300	3 100	5 400
1939.....	2 400	3 400	5 800

<sup>a</sup>Figures are from Bureau of Agricultural Economics, U. S. Department of Agriculture.

in New Jersey, Maryland, and California, and an entirely new region has been developed in Washington and Oregon. There is no evidence that the present popularity of asparagus will soon pass.

## STRUCTURE OF THE ASPARAGUS PLANT

### Underground Development

The underground development of the asparagus plant consists of three parts: the crowns and their lateral extensions, the larger fleshy storage roots, and the fibrous feeder roots.

The lateral growths arise from the central portions of the crown. They extend nearly horizontally outward in friable soil, but grow almost vertically toward the surface if the crown is planted in hard or plastic soil or if planted too deep. In very old plantations or where the soil is eroded, crowns may become entirely exposed. The buds are borne in very compact order on the upper surfaces of these crowns.

The fleshy storage roots grow laterally with such vigor as to reach out 10 to 12 feet from the crowns and penetrate to a depth of 6 to 8 feet. They live for three or four years. New fleshy roots are formed each year.

The fleshy storage roots store the foods that are made in the leaves and stems, and give up these foods to the shoots in the spring. Fleshy roots that are broken die back to the crowns. For this reason special care should be used to break as few of these roots as possible when the crowns are being dug for transplanting.

The fibrous roots absorb moisture and plant foods from the soil. They arise from the fleshy roots in great profusion, and in established plantings may completely permeate the soil. The fibrous roots die in the fall and winter, and new ones develop each spring and summer.

### Above-Ground Development

The stems, which constitute the edible portion of the plant, arise from buds located somewhat back from the ends of the crowns. Several buds close together often send up their spears in succession, making it appear as tho all the spears came from the same place on the crown. Some buds may remain dormant for several years, and then send up small weak spears. On an exhausted plantation these weak spears will constitute most of the crop.

If not harvested as spears, the stems elongate rapidly and develop side branches with small fernlike structures which act as leaves. The true leaves are scale-like and occur at the nodes on the stems and main branches. The stems, the branches, and the leaves all manufacture foods which are later transferred to the roots for storage.

Asparagus is dioecious—that is, its male and female flowers are borne on different plants. Pollination is carried out almost entirely thru the activities of insects. The small round fruits are green, turning to a brilliant red as they mature. If pollination has been complete, there will be six seeds in each fruit.

### WASHINGTON VARIETIES BEST

The Martha Washington and Mary Washington varieties have now replaced nearly all of the older varieties. These two very similar strains were the result of a program of breeding for rust-resistance that was started by J. B. Norton<sup>10\*</sup> in 1906.<sup>a</sup>

Besides being to some degree rust-resistant these varieties are far more uniform in size, vigor, and color than any of the older varieties. The Martha Washington is said to be favored by growers in the northeastern states, but in most other sections the Mary Washington is the more popular.<sup>6\*</sup> Several seedsmen who formerly listed both varieties now list only the Mary Washington. Recent work has shown the superiority of the Mary Washington in California.

Previous to Norton's work, asparagus varieties had never been clearly defined or differentiated. It is quite probable that the older so-called varieties were not varieties at all, but were mixtures of several strains and were simply selections. Some of the earlier varieties were

\*These numbers refer to literature citations on page 35.

<sup>a</sup>Norton's work was the result of a severe epidemic of asparagus rust. This epidemic swept thru Massachusetts, Connecticut, and Long Island in 1896, and then spread rapidly over the country until it was reported from California in 1901. The disease was very destructive and caused widespread consternation among growers.



**Fig. 1.—A promising asparagus field in September**

A vigorous growth of the asparagus plant in the autumn indicates a heavy yield of high-quality spears the following spring.

Conover's Colossal, Reading Giant, Palmetto, Columbia Mammoth White, and Bonvallet's Giant. Of these, only Bonvallet's Giant was developed in Illinois.

## **GROWING CROWNS FOR PERMANENT PLANTING**

### **Only High-Quality Seed Is Worth Sowing**

Seed should be purchased only from growers who specialize in growing asparagus seed. Larger and plumper seeds will produce the larger and more vigorous seedlings.<sup>11\*</sup> Well-bred seed from a vigorous plantation, well-screened for the larger sizes, will cost more than ordinary seed which is unscreened and moreover will have fewer seeds per pound. However, a few extra dollars for a pound of seed is a minor consideration compared with the importance of uniformity and vigor and the fact that an asparagus plantation will probably last from fifteen to twenty years.

Asparagus seed should be purchased only with full knowledge of its production. It must be pure, uniform, and vigorous. If it is claimed to be a Washington variety, by what steps did it descend from Norton's work (page 5)? Is the plantation from which the seed came a vigorous one? Was the plantation first harvested heavily, leaving a weakened crown with a short season in which to produce seed, or was it harvested for a short period leaving a strong crown and a long season for the development of seed? Was all the seed in the field har-

vested, or was there a selection of the seed-bearing plants? Assuming the seed to have been screen-separated into sizes, which size is it that is being considered?

Unfortunately catalog descriptions of seed are often misleading. Purchasers should not be impressed by the big words that are used. *Fancy* may designate the smallest grade of seed. *Selected* and *Re-selected* are meaningless terms unless we are told what factors were involved in the selections. *He-Buck*, *Giant*, and *Mammoth* are terms used to designate the larger-sized seeds.

### Amount of Seed to Buy

About 8 pounds of seed is usually sown for an acre of seedlings. One pound of seed will contain about 22,000 seeds, and if well sown and well cared for, it will produce enough crowns for about an acre of permanent planting even tho the crowns are carefully selected. Enough crowns should be grown to allow for such selection.

Commercial growers, who practice little or no crown selection, usually sow the seed rather thickly. They expect to sell from 100,000 to 125,000 crowns from an acre.

### Loose, Friable Soil Is Needed

The most important consideration in selecting the soil for an asparagus seedbed is the ease with which the crowns can be removed the following spring without breaking more than a minimum number of the fleshy storage roots and without having a lot of soil adhering to them. A loose, friable soil, such as a sandy loam, is best for this reason, as well as for the fact that it can be worked easily in the spring. Clay, clay loam, heavy silt loam, and any other type of soil that packs down into a compact or plastic mass during the winter months are unsuited for the growing of asparagus crowns.

The ideal soil for growing the crowns is much looser and more friable than that in which the permanent planting is made.

### Preparation and Care of the Seedbed

For best results an annual legume, heavy enough to smother all weeds, should be grown the year before seeding and plowed under in the fall. Otherwise, a coat of manure should be spread in the fall and the ground fall-plowed and left in the rough furrow over winter. If fall-plowing cannot be done, well-rotted manure should be applied in the spring, and plowing should be done as early as possible. If the soil



reaction is below pH 6, the soil should be treated with limestone to bring its reaction up to pH 6.8.

Whether fall- or spring-plowed, the soil should be disked and harrowed to make a deep mellow seedbed. A Meeker harrow is a fine finishing tool. It leaves the soil in excellent condition for the seed drill.

Care of the seedbed consists of simply keeping the ground loose and controlling the weeds. If the soil has been well chosen and care-



**Fig. 2.—Vigorous asparagus seedlings two months old**

Sowing the seed between April 1 and May 1 in Illinois gives the seedlings a good start and a long season in which to develop. The planter should be careful to drop the individual seeds at a uniform spacing and depth.

fully prepared, very little work will be needed to keep the bed in good condition.

### **Sowing Asparagus Seed**

In sowing asparagus seed, every effort should be made to drop the individual seeds at uniform spacing and uniform depth. When two or more seeds are dropped together, the seedlings compete directly with each other for sunlight and for soil moisture, and the crowns are weakened as a result. Such crowns become badly interlaced and very hard to separate.

Seed should be sown early in order to give the seedlings a long season in which to develop their crowns. April 1 to May 1 is a desirable planting time for Illinois (Fig. 2).



Asparagus seeds germinate slowly and often irregularly. Various means have been employed to overcome this. One investigator reports<sup>2\*</sup> that soaking seeds in water at 86° F. for 3½ days gave good results and advanced germination several days.

After the seeds have been soaked, they should be spread out to dry off any surface moisture and then planted immediately in moist soil. If the seeds are allowed to lie around in the open air very long before planting, or if they are planted in dry soil, the value of the soaking will be lost.

It is practically impossible to thin asparagus seedlings that have been spaced too closely. Thinning should be done with the seed drill.

### Radish Seeds as Row Markers

The seeds of a globe-shaped variety of radishes are often mixed and sown with the asparagus seeds at the rate of 1 ounce of radish seeds to 1 pound of asparagus seeds. The young radish plants will mark the rows and thus make it possible to cultivate the soil long before the asparagus seeds have germinated or the seedlings have emerged. The radishes, which grow almost on top of the ground, are harvested before the asparagus seedlings need the sunlight or the space that the radishes take up.

### BUYING THE CROWNS

Altho it is usually best for the grower to raise his own crowns, it is sometimes wiser for him to buy them from a professional grower. For example, the decision to plant may have been made too late to grow the crowns, or there may be no soil immediately available that is suited to the growing of crowns. Often a grower feels that it is less trouble to purchase the crowns. He can then use all his labor and equipment on planting rather than dividing his labor into a digging crew and a planting crew. There may be many other good reasons for buying the crowns.

Even when roots are purchased as No. 1, there are always a considerable number of culls and No. 2 roots included. Frequent examinations of shipments of roots from growers of good repute have revealed as high as 10 to 15 percent of culls and 10 to 15 percent of No. 2 roots, by count. However, the percentage of culls on a weight basis was negligible, and the No. 2 crowns are not of great importance *if discarded*. The tendency to plant every crown that is purchased may lead to serious losses.

Number 1 crowns should weigh about 125 pounds a thousand and No. 2 crowns should weigh about 65 pounds a thousand, dug reasonably dry and free from dirt.

On the whole, the advantages of growing the crowns outweigh the disadvantages. The drying out of crowns that are dug in the fall and stored for long periods is often much more serious than is generally

TABLE 3.—EFFECT OF ROOT PRUNING AND DRYING OUT OF ROOTS UPON ASPARAGUS YIELDS<sup>a</sup>

Treatment	Number of crowns	Spears per crown	Weight of spears per crown	Weight of single spears	Yield per acre
Effect of drying out					
1925			<i>grams</i>	<i>grams</i>	<i>lb.</i>
Roots dried out.....	352	1.86	39.41	21.14	250
Roots <i>not</i> dried out.....	353	5.27	90.11	17.08	574
1926					
Roots dried out.....	352	11.13	294.23	26.45	1 868
Roots <i>not</i> dried out.....	353	14.89	360.31	24.20	2 294
Effect of root pruning					
1925					
Roots pruned.....	352	2.46	47.52	19.31	302
Roots <i>not</i> pruned.....	353	5.27	90.11	17.08	574
1926					
Roots pruned.....	352	14.15	327.88	23.17	2 082
Roots <i>not</i> pruned.....	353	14.89	360.31	24.20	2 294

<sup>a</sup>Data from California Agricultural Experiment Station.

supposed. There are many other ways in which purchased roots may have been damaged. They may have been carelessly dug, and this carelessness may have resulted in severe pruning of the fleshy roots and much tearing apart and mangling of the crowns. The fleshy roots are sometimes deliberately cut off to facilitate packing. Often the roots are pressed together and then allowed to dry out, with the result that they cannot be spread out in the furrow when planted.

Table 3 shows clearly the serious effect of drying out and the nearly equally serious effect of breaking, tearing, or pruning the roots. One of the advantages a grower has who grows his own roots is that special care can be used in digging the roots to prevent breaking or pruning them and that they can be planted before they have a chance to dry out.

## SOIL AND SITE FOR PERMANENT PLANTING

### Choosing the Soil

Asparagus is grown successfully on several types of soil in Illinois. At Princeville and at Aurora there are large and very productive plantings on Saybrook silt loam. At Godfrey the asparagus is grown on relatively young and light-colored loess-derived soils; this type of soil is very well adapted to growing asparagus. The large plantings at Rochelle are mostly on Brenton silt loam which is developed on outwash plains. After surface drainage, this type of soil is unsurpassed for asparagus-growing.

While these soils differ considerably in many details, they have several characteristics in common: They are highly fertile; all have good subsurface drainage; they are all friable, mellow, and easily worked; and they do not clod or lump badly. Asparagus should not be planted on swampy or undrained areas even tho the areas may be ideal otherwise. Neither should it be planted in sticky clay or other soil types that are plastic when wet and that bake into a hard crust when dry.

It should always be remembered that asparagus needs large amounts of plant foods; a high degree of natural fertility is necessary for economical production.

### Choosing the Site

If a favorable soil type is available, the choice of the site is not difficult. Areas should be selected that will not erode badly. An elevated area that will give good air drainage is a marked advantage, as it will frequently escape frosts that do great damage in nearby lower areas. A southern slope has some advantage for the market gardener in bringing out the first spears a day or two earlier than otherwise. A west and northwest windbreak will hold off many cold winds and prevent overdevelopment of the purple or reddish color.

### Preparing the Soil

The soil for an asparagus planting should receive all the care and preparation that is given to soil on which a fruit orchard is to be planted. It should be carefully tested for acidity. If necessary, limestone should be added to bring the reaction up to pH 6.8 or pH 7.0. If little or no manure is available, a heavy cover crop, such as soybeans, should be grown and plowed under to add as much organic matter to the soil as possible. Unless the soil is well provided with phosphorus, a heavy application of this element should be made.

Probably the greatest advantage in growing the crowns is that it gives an entire season to get the field for the permanent planting in the best condition. If the soil is already in good condition, a cultivated crop may be grown, provided the weeds can be kept under complete control. After this crop is harvested, a heavy coat of manure should be applied and the soil fall-plowed. The soil should then be allowed to lie in the rough furrow without harrowing, so that it will take up and hold as much moisture as possible and will warm up early in the spring.

## **WIDTH OF ROW AND DEPTH OF FURROWS**

### **Row Width Depends Largely on Equipment**

Before preparation for planting begins, the width of the rows must be determined. The most common distance is 5 feet, and this will prove satisfactory under a wide range of conditions. It allows good space for working and is convenient for several types of harrows and weeders. The width varies from 3 feet to 10 feet in Illinois. The advantage of the 10-foot row is that 8-foot disks can be used between the rows for weed control for several years after planting. This distance has been used also with a view to getting good control over the weeds for a few years and then planting other rows down the middle of the rows. Several growers plant in 8-foot, 7-foot, and 6-foot rows.

The selection of a particular width depends mainly upon the type of cultivators and weeders that are to be used and the degree of ridging that is to be done. Narrow rows are usually found in the smaller market-garden plantings, where space is very valuable and labor relatively abundant. Here 5-foot, 4-foot, and even 3-foot rows are common. These plantings usually become very weedy and are likely to be short-lived. Attempts to check the crowns 3 feet by 3 feet to allow for cross-cultivation have not been successful, for the crowns do not grow out regularly, and soon it becomes impossible to cultivate at all.

### **Furrow Depth Varies With Soil**

Eight inches is now nearly a standard depth for asparagus, altho roots were formerly planted much deeper. An 8-inch furrow can be made without undue effort or expense. It sets the crowns deep enough for the field to be disked and cross-disked in working manure and old stems into the soil. It does not unduly delay the emergence of the

first spears in the spring. On light sandy soils it is possible that 10 inches would be better, and on heavy soils 6 inches may be better.

### Making the Furrows

Strong tractors have solved the problem of making the furrows. Ditcher plows, deep listers, or ordinary breaker plows set at the desired depths are easily pulled by tractors. Sometimes a gang of two plows is pulled abreast. On smaller plantings a strong team may be used with



Fig. 3.—Finishing up the furrows

After the furrows have been made with a large plow or lister, some hand-shoveling is necessary to smooth them out. Planting should be started as soon as the furrows are finished.

an ordinary plow set deeply. To get the desired depth, the plow is sometimes returned in the same furrow but in the opposite direction. Wings of some kind on the plow are usually needed to push the earth back from the furrow. Usually, too, it is necessary to do some hand work with long-handled shovels to clean out the bottoms of the furrows and prepare them for the crowns (Fig. 3).

Any attempt to make the furrows before the ground is ready to be worked will result in disappointment. The soil will turn up lumpy and puddled and will be very difficult to handle. If the field was plowed in the fall, a double disking and harrowing will put it in condition. If it was not fall-plowed, it should be plowed at the very earliest opportunity in the spring.

## PLANTING THE CROWNS

### Digging the Crowns

Ideally the crowns would be dug, sorted, and planted the same day. This, however, is seldom possible. Generally the seedbed will be on much sandier, looser, and drier soil than that on which the permanent planting will be made. This makes it possible to dig the roots a week or more before they can be planted. Digging the crowns a few days before planting gives time for careful sorting of the roots and levels off the labor load.

The crowns should be dug as early in the spring as the soil can be worked. The diggers should be very careful not to break the fleshy storage roots. Generally a wide-bottom plow is used to turn the crowns out. Sometimes the moldboard is taken off and replaced by a set of steel fingers. If the soil has been well chosen, the crowns can be picked up with a four-tined pitchfork. They are then shaken to remove all loose dirt and are placed in baskets, boxes, or crates to await sorting. During the period between digging the crowns and planting them, the roots should be kept moist by piling hay or straw over them or by placing them in a basement where the humidity is high.

Commercially grown crowns are usually dug in the fall and stored in root cellars or in storage pits. In spite of efforts to prevent it, these roots have nearly always suffered some drying out, and this is often serious. Home-grown roots may also be dug in the fall, but the practice is not recommended.

### Sorting the Crowns

The crowns should be sorted very critically, and all that do not reach a high standard should be discarded. The number, size, and length of the storage roots should be considered, as well as the size and number of buds (Fig. 4). One of the important advantages of growing the crowns at home is that such crowns will usually be more carefully sorted than purchased crowns.

Sorting the crowns has been a much discussed subject among growers. Failure to adequately define the terms *No. 1*, *No. 2*, and *cull* has led to many differences of opinion. Crowns that would be classed as *No. 2* by some growers would be classed as *cull* by others, while still other growers would class many of them as *No. 1*. All growers agree that *culls* should be discarded.

Some investigators<sup>9\*, 3\*</sup> have concluded that there is no difference in yield between the *No. 1* and *No. 2* sets. One who reported<sup>4\*</sup> some

relation between the weight of the crowns and the yield in male plants found no such relation in the female plants. Another<sup>6\*</sup> states that careful crown selection would be justified entirely from the standpoint of stand secured. An example is cited of several hundred acres planted with ungraded roots in which a stand of 64 percent was secured. This necessitated very costly replanting. Later, on the same farm, a planting of carefully selected roots gave a 100-percent stand.

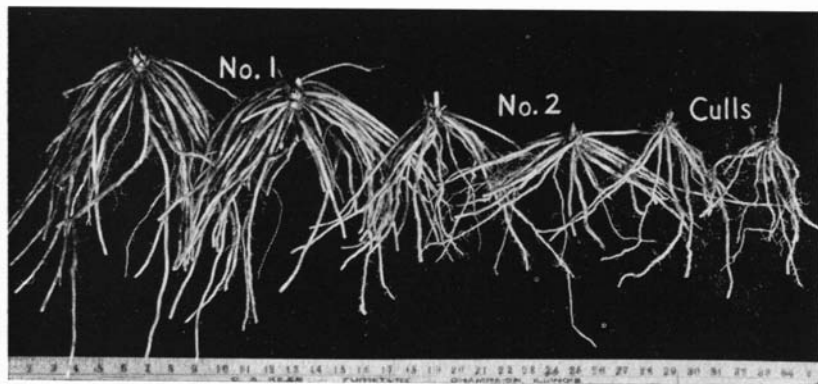


Fig. 4.—Different grades of one-year-old asparagus crowns

Only crowns having 20 to 30 large storage roots and 2 to 4 large buds should be planted. The culls should be discarded.

Practical experience in Illinois has shown that stands of 95 to 99 percent can be obtained from carefully sorted roots. A commercial planting of several acres with No. 1 and No. 2 roots showed the No. 1 planting to have more shoots, taller shoots, and a visibly better stand than the No. 2 planting. Thus, altho No. 1 roots do not always give significantly greater yields per plant than No. 2 roots, they show a superior acre yield due to better stands.

### Spacing the Crowns in the Row

In Illinois 18-inch spacing in the row would seem to be a favorable spacing under most conditions. One investigator gives<sup>5\*</sup> the result of a study in which plants were set at spacings of 12, 18, 30, and 36 inches in the row, and harvest records both by count and by weight were kept for a period of seven years. Under the conditions of this test, 18 inches proved the most favorable spacing. It was superior to the 12-inch spacing in size and weight of the spears and was markedly superior to the 30-inch and 36-inch spacings in total yield per acre.





**Fig. 5.—Setting asparagus crowns in the furrow**

Planting can best be done by two men working together. One man drops the crowns into the furrow at approximately the correct spacing; a second workman straightens them out, spaces them properly, and covers them just enough to prevent them from drying out.

In the large tractor-worked plantings, the tendency is toward wider rows with closer spacing in the rows. In smaller plantings the tendency is toward narrower rows and wider spacing in the row.

### **Setting the Crowns in the Furrow**

When the furrows are ready, men with baskets or open-top bags strapped over their shoulders drop the crowns into the furrows at about the proper spacing. Other men follow immediately, straightening out the roots, spacing the crowns correctly with the buds upward, and covering the crowns enough to hold them in place. This requires careful work, but men who understand the work can do it very rapidly (Fig. 5).

Covering the crowns properly calls for care. If the crowns are not covered deep enough, there is danger that they will dry out, with consequent loss of vigor. If they are covered too deep, the shoots may have trouble in emerging or may even be completely smothered. The strength and vigor of the roots, the plasticity and packing character of the soil, and weather conditions should all be considered. The object is to get the little fernlike shoots out into the sunlight as soon as possible. In New Jersey, where the soils are

sandy, the crowns are covered to a depth of 3 to 4 inches immediately after being set. On most Illinois soils 2 inches is a desirable depth for the first covering.

Asparagus crowns should not be set under such unfavorable conditions that the soil will puddle over them. The planter should wait for more favorable conditions.

### Cultivation After Setting

After the crowns are set in the furrow and lightly covered, further care is very simple. In a few weeks the first little fernlike shoots will appear. Using care not to break or cover these shoots, the planter should run a light cultivator along the ridges, working more loose soil into the furrow and around the shoots. Soon other shoots will appear and the original shoots will be several inches tall. Another cultivation will work still more soil into the furrow and around the plants. Growth will be rapid, and more cultivations, supplemented with some hand-hoeing, should find the furrows completely filled by late June or early July (Fig. 6).

After July 1 the only care needed is the control of weeds. After August 1 there should be little if any cultivation except for a few trips thru the patch at intervals to hoe out the weeds. Weeds should never be allowed to go to seed in a new asparagus plantation.

Intercropping is sometimes attempted by market gardeners who feel the need for some income from the land before the plantation is ready for harvesting. This practice cannot be recommended because it interferes too seriously with the proper care of the asparagus.



Fig. 6.—Furrows are filled by successive cultivations

Cultivations break down the ridges and throw the dirt into the furrows. By midsummer the field will be leveled off.

### Fall Preparation and Planting Not Advised

Many attempts have been made to prepare the furrows in the fall in order to reduce the peak load of labor, often interrupted by showers, that occurs when planting is done in the spring. Plantings have also been attempted in the fall. Where conditions were very favorable, such attempts have proved successful, but in the great majority of cases they have not been successful.

When the furrows are made in the fall, winter rains and snows fill the furrows with water which is usually very difficult to get rid of. When this water finally evaporates or seeps away, it leaves the bottoms and sides of the furrows in an unworkable condition. A few growers have overcome part of this problem by filling the furrows with manure. This keeps the soil from hardening, but it does not keep the water out of the furrows (Fig. 7).

When the crowns are planted in the fall, and water stands over them for a time, they are likely to rot. If the furrows are filled over the fall-planted crowns to prevent water from standing over them, many crowns may be smothered and never come up. But even where water is not a problem, most soils become so hardened during the winter that they must be reworked in the spring before they are in fit condition to receive the plants.



**Fig. 7.—Fall-made furrows are hardened and caked by spring**

Even tho manure is placed in the furrows to prevent them from hardening, the water that accumulates may leave the furrows in unworkable condition for spring planting.

## CAUSES OF POOR STANDS

In the fall of the year of transplanting, the stand of plants may vary from 60 to 100 percent. The use of weak or dried-out crowns is the most likely cause of "skips," or missing plants. Other frequent causes of skips are: poorly chosen soil or site, inadequate preparation of the soil, crowns with badly pruned roots, and crowns with only one bud and that one bud broken off or smashed in shipping. Most of these can be prevented by careful crown selection.



**Fig. 8.—Good stand on a one-year-old planting**

Only by carefully selecting the roots and carefully planting them can a good stand of asparagus be obtained; and a good stand is essential to profitable production.

Covering the crowns too deep, especially if the soil is at all plastic, and careless cultivation which smothers the shoots or breaks them are other common causes of poor stands. Occasionally a single-stemmed plant will be whipped and broken by the wind. Many other factors may contribute to the number of skips.

Replanting is a very costly operation. If the stand is less than 75 percent, it is likely that the living plants will be unthrifty and that the trouble is so deep-seated that some thought should be given to disking up the plantation and either abandoning the project or starting all over again. If the stand is 90 percent or more, the skipped places should be reset the following spring as soon as they can be definitely located.

## CARE OF PLANTATION UNTIL HARVEST

In the fall after the asparagus plants are set, the plantation is established except for any resetting that may be done the next spring. Care of the plantation from this time until harvesting begins in the second or third year is simple. It consists entirely of control of weeds, disposal of the dead stalks, control of asparagus beetles, and keeping the soil in a favorable condition.

### Disking the Stalks

The tops should be left standing in the field over winter and should be disked into the soil in the spring. Formerly it was advised that the dead stems be mowed late in the fall or early winter, raked off, and burned, and that a heavy application of manure be made and left on the ground over winter. All too frequently, however, when mowing is done in the fall, it is done before all of the food in the stems has been transferred downward into the fleshy roots. It is now known that



Fig. 9.—Old stalks should be disked in early spring

Care of the asparagus plantation in the spring consists of thoroly disk-ing into the soil the old stalks and any manure that has been applied. A smoothing harrow should follow the disk. The first spears will appear in a few days.

burning the tops is of little value in controlling rust because most of the rust spores drop to the ground before the mowing is done. Except in the sandiest and driest soils the old tops disintegrate and add appreciably to the humus in the soil.

It is recommended that manure be applied among the dead stalks in late fall or winter and that the dead stalks and manure be disked together into the soil as early in spring as the ground can be worked without lumping or puddling.

### **Cultivation and Weed Control**

After the spring disking, the soil should be harrowed to level it off. After this is done, the problem is simply one of controlling weeds. Frequent rather shallow cultivation, with some hand-hoeing until about July 1 and an occasional hand-hoeing thereafter to prevent any weeds from going to seed, is all that is required.

## **HARVESTING THE SPEARS**

### **Cutting First Year After Setting**

Whether it is wise to cut asparagus for even a short period the year after setting is a much discussed question and opinions differ. Studies made at the Cook County Experiment Station of the University of Illinois from 1926 to 1937<sup>8\*</sup> show conclusively that under the conditions of that experiment even a two-weeks' harvest the first year after transplanting reduced yields for several years thereafter. Harvesting for 4 or 6 weeks the first year after transplanting reduced the yields severely for several years thereafter. On the other hand, a two-weeks' harvest the second year after transplanting improved the yields as compared with waiting until the third year before harvesting. It was concluded that probably a light cutting the second year had stimulated a branching of the crown which was favorable to greater production.

These findings are not in full accord with the opinion of New Jersey authorities, who state,<sup>12\*</sup> "Where well grown roots are planted and excellent care is given the bed, it is possible to cut good stalks of asparagus one year after setting for a period of one to three weeks; the second year after setting, for about five weeks; and until about July 4, the third and succeeding years."

In California and Arizona the beds are usually cut for a short period the year after planting if growth was good the first year.<sup>7\*</sup>

## Cutting and Gathering Asparagus

**Depth of cutting.** Standard practice in Illinois has been to cut each asparagus spear from  $\frac{1}{2}$  to 1 inch below the surface of the soil. In the East all spears are cut at least 9 inches long even tho it may mean going several inches into the soil and may add several inches of tough white butts to the spears. There seems to be little justification for this practice, other than market preference for a 9-inch bunch.

Canneries usually specify that asparagus must be cut slightly above the surface of the ground to keep the butts free of soil. Some growers contend that cutting slightly below the surface prevents "bleeding." Others contend that cutting above the surface promotes rapid drying of the stub and in this way prevents excessive loss of moisture. There is no experimental evidence on this point.

**Knives.** Asparagus is cut by using various specially designed knives and cutters. The long-handled fish-tail knife is probably the most popular. Butcher knives with very narrow blades and long-handled straight-edged knives of various kinds are also used. In New Jersey a concave knife is used. A good grade of putty knife swung from the wrist with a rubber band makes an excellent tool, except that it requires the cutter to lean over farther than a long-handled knife does. The knife swings free from the wrist, leaving the hand free until the knife is needed. It is then brought into grasp by a swinging motion. The spear is grasped lightly at the tip by the left hand, and the knife is placed against the butt of the spear and thrust forward by the right hand. Cutting knives must be kept sharp so one short thrust will cut the largest spears cleanly and easily without further jabbing.

**Baskets.** Sometimes the cutters carry baskets. This practice, however, is inconvenient because it requires a constant setting down and picking up of the basket. When the asparagus is being cut for market, the baskets are taken directly to the packing shed. When large crews are using baskets while cutting asparagus for a cannery, the baskets are weighed as a basis of paying the cutter. The asparagus is then transferred by handfuls into large crates or lugs, which are hauled to the cannery (Fig. 10).

In northern Illinois a narrow and deep sheet-metal basket is used. The basket is closed in front and open in the rear. It is attached to the cutter by a wide belt strapped around his waist. A swivel joint attaches the basket to the belt. As the cutter leans forward to grasp the spears, the basket tips forward toward the closed end. The spears



are placed in the baskets with the butts forward. When the basket is filled, the cutter kneels beside a crate or lug and tips the basket backward, sliding the asparagus out of the basket into the crate.

In many fields the asparagus is gathered by the handfuls and laid on the top of the rows, to be picked up by other workers who follow with wide-wheeled carts on which are carried baskets or crates arranged so as to be easily unloaded at the packing shed. This is the easiest system for the cutter but it is not necessarily the easiest from the management standpoint.



Fig. 10.—A common method of harvesting asparagus

More often the cutter gathers a handful of spears and lays them on the ground for a helper to pick up. A sharp knife is essential for cutting the spears.

**Frequency of cutting.** Weather must determine the frequency of cutting. As a rule asparagus must be cut every day during the harvest season. When a shower is followed by very warm weather, it is sometimes necessary to cut twice daily. During cool spells cutting on alternate days may be sufficient.

The cutter must decide whether a shoot should be left until the next cutting to increase its length or should be cut to prevent its feathering out and becoming worthless. Again the importance of a sharp knife must be emphasized. The loss of many spears and the injury to many more caused by jabbing several times with a dull knife is much greater than is usually supposed.

### Length of the Cutting Season

In Illinois, harvest begins from April 15 to 20 in the southern counties and from May 1 to 10 in the northern counties. It extends to about June 20 and July 1 respectively in these regions. A harvest period of 7 to 8 weeks seems to give the maximum yield over a period of years in the Middle West. Observant growers can always tell when the harvest should be discontinued by the general decrease in length and diameter of the spears. This decrease in size and vigor marks the degree of exhaustion of the food supply in the crowns. An overharvested bed will show the effect of overharvesting in reduced yields for several years thereafter. Indeed, if one wishes to kill a bed, the best way to do it is to continue to harvest the spears thruout the entire summer.

The number of spears cut and the length of the cutting season vary according to the weather, the price received for the crop, and the closing date of canneries. In the fresh-asparagus market the price is likely to be good for some time and then to decline markedly as peas and other competing products come onto the market. Asparagus cutting is then usually discontinued. When cutting for the cannery, the grower is paid a flat price for each grade thruout the entire season. Usually there is a stipulated closing date. Cannery who process peas like to wind up the asparagus pack just before the pea pack begins. Cannery who do not pack peas may be inclined to ask their growers to extend the cutting season longer than is good for the plantation.

One investigator found<sup>5\*</sup> that a normal cutting season gave markedly greater yields and larger spears over a number of years than did a lengthened cutting season. This effect was more marked in the female than in the male plants. Another investigator<sup>4\*</sup> discontinued cutting at various dates extending to July 15 and concluded that July 15 was "altogether too late," and thought further study would lead to the conclusion that July 1 was also too late. It has been shown<sup>14\*</sup> that there is a direct relation between the number and size of the stalks which mature in the fall and the number of buds formed. It was noted, however, that the number of buds formed on an individual plant did not vary greatly from year to year.

### Discard Cull Spears

The normal asparagus shoot grows straight upward; the head does not open to form side branches until the shoot is several inches tall; and it is green in color, from near the surface of the soil to the tip.

If the spear varies greatly from any of these three conditions, it is considered a cull and should be discarded.

*Crooks*, the term applied to crooked stems, may be caused by careless cutting which injures the spears before they have emerged, insects eating holes in the spears, cold winds, lumpy soils, or sticks, stones, or other impediments to straight growth. Hard clay or other plastic soils are unsuited to asparagus growing because of the number of crooks produced on such soils.

*Feathery* describes spears in which the head has opened prematurely. This is usually an indication of age and lack of vigor, tho it is to some degree a genetic factor. Very weak or dying crowns will send out spears that feather almost as soon as they emerge.

*Purple stems* are stems in which the reddish pigment (anthocyanin) has developed to such an extent that it covers up the green color. The reddish pigment is always present in green asparagus, but under normal conditions it is masked by the green color of the chlorophyl. Purple stems are associated with cool weather and slow growth.

Many attempts have been made and are being made to breed the anthocyanin out of asparagus, but these attempts have always resulted in the production of white or colorless strains, such as the old Mammoth White.

## MARKETING ASPARAGUS

### Sorting Fresh Asparagus for Market

After all feathered spears, all crooks, and all broken and injured spears have been removed as culls, asparagus for the market should be sorted for color according to the length of the green portion of the spears and for size as expressed in diameter.

The length of the green portion of the spear was found, in a study made at the Boston market,<sup>15\*</sup> to be the principal factor in price received. An additional 38 cents per dozen 2-pound bunches was received for each additional inch of green spear up to 8½ inches.<sup>a</sup> Size of spear as expressed in diameter was second in importance as a factor in price. Four cents less per dozen bunches was paid for each additional spear in a 2-pound bunch.

No studies similar to the Boston study have been made in Illinois

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<sup>a</sup>Bunches having 4 inches of green sold for \$1.78 a dozen, bunches having 6 inches of green sold for \$2.54 a dozen, and bunches having 8 inches of green sold for \$3.31 a dozen.

markets, but it is probable that the same factors would control the price in about the same proportions.

### Grades of Illinois Asparagus

Both the U. S. Department of Agriculture and the Illinois State Department of Agriculture have published grades for asparagus. The Illinois grades are described as follows:<sup>a</sup>

**Illinois Fancy** shall consist of fresh, well-trimmed stalks of asparagus which are straight, and free from broken or branching tips, decay, dirt, or disease, and free from injury caused by insects or mechanical or other means.

The diameter of each stalk shall be not less than  $\frac{3}{4}$  inch at the butt. When packed in pyramid boxes, the bunches shall contain not more than 15 stalks of not less than  $7\frac{1}{2}$  inches in length. In order to allow for variations incident to proper grading and handling, not more than 5 percent, by count, of any lot may not meet the size requirements.

In addition, not more than 5 percent, by count, may be below the remaining requirements of this grade, but no part of this tolerance shall be allowed for decay.

**Illinois No. 1** shall consist of fresh, well-trimmed stalks of asparagus which are not badly crooked, which do not have broken or branching tips, and which are free from decay and from damage caused by dirt, disease, insects, or mechanical or other means.

When packed in pyramid boxes, the bunches shall contain not more than 24 stalks not less than  $7\frac{1}{2}$  inches in length. *Unless otherwise specified*, the diameter of each stalk shall not be less than  $\frac{1}{2}$  inch at the butt. When packed in flats or sectional boxes, the asparagus shall not be less than  $\frac{3}{8}$  inch in diameter at the butt and not less than  $7\frac{1}{2}$  inches in length.

In order to allow for variations incident to proper grading and handling, not more than 5 percent, by count, of any lot may not meet the size requirements. In addition, not more than 5 percent, by count, may be below the remaining requirements of this grade, but no part of this tolerance shall be allowed for decay.

**Illinois Field Run** shall consist of fresh, well-trimmed stalks of asparagus which are not badly crooked, which do not have broken or branching tips, and which are free from decay and from damage caused by dirt, disease, insects, or mechanical or other means.

There shall be no size requirements for the diameter but the stalks shall not be less than  $7\frac{1}{2}$  inches in length.

**Illinois Utility** shall consist of fresh, well-trimmed stalks of asparagus which are free from decay, and which are not badly crooked and seriously damaged by broken or branching tips, dirt, disease, insects, or mechanical or other means.

When packed in pyramid boxes, the bunches shall contain not more

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<sup>a</sup>Illinois State Department of Agriculture, Division of Markets, Springfield.

than 36 stalks of not less than  $7\frac{1}{2}$  inches in length. *Unless otherwise specified*, the diameter of each stalk shall not be less than  $\frac{1}{2}$  inch at the butt. When packed in flats or sectional boxes, the bunches shall contain stalks not less than  $\frac{1}{4}$  inch in diameter at the butt and not less than  $7\frac{1}{2}$  inches in length.

In order to allow for variations incident to proper grading and handling, not more than 5 percent, by count, of any lot may not meet the size requirements. In addition, not more than 5 percent, by count, may be below the remaining requirements of this grade, but no part of this tolerance shall be allowed for decay.

**Unclassified** shall consist of stalks of asparagus which are not graded in conformity with the foregoing grades.

**Color.** Any lot of the green varieties of asparagus shall not contain more than 10 percent, by count, of stalks showing more than  $1\frac{1}{2}$  inches of white at the butt.

The average grower will probably find these grades sufficient. Growers of a larger and a fancy crop may find further grading advisable. In New Jersey a few growers describe their grades as Colossal, Extra Fancy, Fancy, Choice, and Prime.

### Care of Cut Spears

Asparagus should always be marketed very soon after it is cut, for changes affecting both its chemical composition and its structure begin to take place almost immediately after it is harvested. There is a loss of sugars, which impairs the flavor of the asparagus, and an increase in fibres, which makes it tough and stringy.

The above changes are retarded by low temperature.<sup>1\*</sup> At 33° F. little change occurs in the first 24 hours. One Illinois grower has built an insulated chamber in his packing shed in which he has placed an electric fan to blow air over a quantity of ice and thus cool the crated asparagus. When asparagus must be held for several hours after it is packed and before it goes to market, the construction and use of such insulated chambers is advised. The cooling effect of a single cake of ice in an insulated chamber is surprising.

### Selling to Canneries

Most of the asparagus which canners purchase from growers is bought on a one-year contract, altho there are some three-year and five-year contracts. The contracts vary greatly in their provisions. Some call for entirely ungraded, unwashed, and unbunched asparagus, simply cut and thrown into a bushel basket, while others call for spears graded in two sizes, with no white on the butts, bunched and

banded as carefully as for sale on the fresh market. Prices have varied approximately in accordance with the conditions of the contract.

In Illinois several canning companies have large asparagus acreages of their own. During the past few years those canners who grow little or no asparagus of their own have been forced to go long distances to secure asparagus for canning.

In the New Jersey-Maryland region, where the canners buy the asparagus for their entire pack, a system of buying by grade has been developed. State-employed inspectors grade each load as it comes into the factory. This system has much to commend it.

The great bulk of California asparagus acreage is owned by the growers. During the early period of high prices the entire crop is harvested and sent to the fresh-asparagus markets of the eastern states. When prices decline, this shipping abruptly ceases, high ridges are thrown up over the rows, and the rest of the crop is harvested and canned as white asparagus.<sup>a</sup> Even in California, however, the canning of green asparagus is showing some increase.

### Quick-Freezing Asparagus

Frozen asparagus has not yet attained the popularity of frozen peas, lima beans, or strawberries, but as the technic for freezing it is improved, it will probably gain in popularity, and growers will experience a demand for a kind and quality of asparagus that will be suited to this method of preservation and marketing.

Commercial freezing of asparagus was undertaken in a small way in Illinois in 1939.<sup>b</sup> Various interests made surveys of the growing regions, age of plantations, and acreages available, and gathered other information bearing on the possibilities of quick-freezing on a larger scale. An exceptionally high grade of asparagus is required for quick-freezing.

All equipment for the preparation of asparagus for quick-freezing is the same as that for canning. If quick-freezing is to be done, the canneries already established which have the equipment and the trained personnel would be in the best position to do it, since only the equipment for freezing would need to be added.

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<sup>a</sup>This shift from the fresh market to the canneries has caused considerable confusion in statistics on asparagus acreages.

<sup>b</sup>Until 1937 New Jersey and California were the only states to freeze asparagus commercially. In 1938 commercial freezing was done in the newer asparagus-producing regions of Oregon and Washington.

## CARE OF THE MATURE PLANTATION

### Fertilizing the Soil

A large yield of high-quality asparagus cannot be hoped for if an abundant supply of plant food is not made available.<sup>16\*</sup> However, in Illinois, large amounts of fertilizers may not always prove profitable. Soil tests should be made to determine the needs of the soil before heavy applications of fertilizer are made. Asparagus uses a large amount of nitrogen, and this must be provided if the spears are to be large and succulent. In regard to the other plant-food elements, New Jersey authorities say,<sup>12\*</sup> "The soil should test pH 6.8; the calcium medium to high or very high; the magnesium, medium to high; the phosphorus, medium; and the potash medium to high. If the calcium is very high, the potash should be high."

On Lisbon silt loam, a very productive type of soil at the Cook County Experiment Station, the best yields were obtained from an application of 1,000 pounds of a 6-8-4 fertilizer per acre. The applications were made at the close of each cutting season. While this treatment over a period of years gave about 15 percent (about 700 to 800 pounds) more marketable asparagus than the adjacent untreated plots, such increases are not large enough to be very profitable. It is noteworthy that the check plots, which were untreated but were otherwise well cared for, yielded approximately 2½ tons of marketable asparagus per acre each year.

**Cyanamid.** Calcium cyanamid, sold as Cyanamid, is a relatively new nitrogen fertilizer. It has 22 percent of nitrogen in a calcium carrier. When it is applied to moist soil, it goes thru several chemical reactions, one of which makes it deadly to small weeds and to weed seeds that have begun to germinate. Thus it has three uses when applied to an asparagus bed: it provides a readily available nitrogen, its calcium tends to neutralize soil acidity, and it acts to a considerable extent as a weed-killer.

In general, it is recommended that the Cyanamid be applied when the first weeds of spring are in the cotyledon stage. The application is made in bands 18 inches wide on top of the row and at the rate of 1 pound for 35 feet of row. If the rows are 5 feet apart, about 250 pounds to the acre will be required. This amount has given a very satisfactory control of weeds, other than grasses, during the cutting season. When fields are weedy, it would seem wise to purchase at least a part of the nitrogen in the form of Cyanamid. In a test reported by



the Ohio Station,<sup>13\*</sup> nearly perfect weed control was obtained thruout the cutting season by applications of Cyanamid.

**Time to apply fertilizers.** Fertilizers may be applied in the spring before the harvest season begins or in the summer immediately after the harvest season. In either case they are broadcast and worked into the soil by cultivation. Nitrogen fertilizers such as Cyanamid or nitrate of soda are applied as top-dressing over the rows. These nitrogen fertilizers will probably give best results when applied before the cutting season begins.

**Salt.** Salt is a good weed-killer when applied in large amounts but it has very little fertilizing value. It was formerly applied widely to asparagus plantings but the practice has long since passed.

### Weeds Must Be Controlled

In Illinois the control of weeds presents a very difficult problem. If an asparagus plantation is to be profitable, weeds must be controlled.

Most of the weeds can be controlled by disking just before cutting begins in the spring, cultivating between the rows as required during the cutting season, and continuing to cultivate after the cutting season until the stalks are grown. Pulling the few weeds that develop in late summer and early fall once or twice will prevent these from going to seed.

Cover crops, sometimes sown between the rows for the purpose of adding organic matter to the soil, help to control weeds to some extent. Cyanamid (see page 29) will also give good weed control.

Weeds growing in the rows during the cutting season present a difficult problem. The weeder shown in Fig. 11 has lately been revived and is proving very effective. One horse easily pulls one of these weeders over two rows of asparagus. The long curved teeth touch the soil lightly, stirring the surface and destroying most of the weed seedlings before they emerge. The teeth turn aside for any obstruction, even that presented by an asparagus shoot. Used in the afternoon when the spears are less brittle than in the morning at cutting time, this machine will control weeds in the row, keep the soil in good condition, and will break or injure only a negligible number of spears.

### Care After the Cutting Season

Unless absolutely necessary, disking and cross-disking the asparagus field immediately at the close of the cutting season should not be done. This disking may be necessary at times to break down high

ridges, to work manures or fertilizers into the soil, or to control weeds that have gotten out of hand during the cutting season. Yet the destructiveness and undesirability of this practice should be recognized. The deep-going disk must necessarily cut off a tremendous number of spears and injure many more. Two or three days are required, even



**Fig. 11.—Weeder at work in asparagus plantation**

This type of weeder is now in common use during the cutting season. It breaks very few spears if used in the afternoon, for the spears are less brittle then than in the morning.

in a young and vigorous plantation, before new stalks come thru the soil. This loss of stalks, and especially this loss of time before the processes of manufacturing food for next year's crop can begin, is a serious waste.

Cultivation between the rows usually is a better practice than deep-disking the rows.

### **Ridging Is a Questionable Practice**

There is a general practice in Illinois, as elsewhere, of plowing or disking the soil up over the rows in ridges. Even in young plantations not yet in harvest this ridging is practiced. Much of this ridging is not only unnecessary but also undesirable. Probably the practice is chiefly due to established custom.

While some ridging is often necessary and almost unavoidable in cultivation and weed control, it should be recognized that ridges are not of themselves desirable.

## Asparagus Rust

Asparagus suffers from only one serious disease, asparagus rust (*Puccinia asparagi*), the disease which seriously disrupted the industry from 1906 to about 1920. It was this disease that brought about Norton's great work in breeding the rust-resistant varieties, Martha Washington and Mary Washington. These varieties not only solved the rust problem very satisfactorily but also gave a uniformity of vigor, size, and color far superior to that of any previous varieties.

Control measures are usually not necessary when either of the Washington varieties is planted. However, even these varieties are not completely resistant to rust, as was evident in 1938 and 1939 when some apprehension over a rust threat was felt in certain regions of Illinois. Should it ever become necessary to protect these varieties against rust, it is probable that a sulfur dust could be used for that purpose.

## Insect Enemies

The common asparagus beetle (*Crioceris asparagi* (L.)) is the only important insect attacking asparagus. The adults are slender bluish-black beetles about  $\frac{1}{2}$  inch long with artistically arranged orange to red markings. The overwintering adults emerge just about the time the asparagus harvesting season begins. They often do considerable damage by eating holes in the tender spears, which causes the spears to crook and become unmarketable. Sometimes the females lay their eggs on the spears. These are unsightly and may make the spears unmarketable.

Great damage is often done by this insect in the seedbeds, where adults and larvae combine to strip the seedlings of all leaves, weakening or killing them. The same damage may occur in one- and two-year-old plantations not yet in harvest. The second generation, which appears in July, often seriously damages the tops of the spears in both young and mature plantations (Fig. 12).

Control during the harvest season is sometimes accomplished by leaving an occasional weak spear to feather out and act as an egg trap. The females prefer to lay their eggs on the smaller branches. If the infestation is serious, large numbers of eggs will be laid on these plants. These weak spears are cut off during the next harvest and allowed to lie on the ground and dry up. This kills the eggs. This procedure is repeated at each cutting, or until the beetles are gone. When infestation during the harvest season is serious, a dust containing  $\frac{1}{2}$  to 1 percent of rotenone applied at the rate of 15 to 30 pounds an acre



Fig. 12.—Common asparagus beetle

The adults (*center*), larvae (*left*), and eggs (*right*) of this beetle can all be seen on this asparagus plant. Both adults and larvae are ravenous feeders. Control measures applied to the seedbed, to the young plantation, or to the plantation after the harvest season is over will usually keep these beetles in check. Occasionally control measures during the harvest season are necessary.

(depending on the percentage of rotenone) while the beetles are actively feeding, will give a good measure of control.

In the seedbeds, in a young plantation, or in a mature plantation after the harvest season is over, a spray consisting of 3 pounds of lead arsenate in 50 gallons of water, to which has been added 1 quart of Penetrol or 3 ounces of sticker-spreader, will give a good measure of control. The rotenone dust mentioned above may also be used but is somewhat more expensive.

**The twelve-spotted asparagus beetle** (*Crioceris duodecimpunctata* (L.)) is another insect that sometimes becomes troublesome. This species emerges later than the common asparagus beetle and hence does less damage during the cutting season. The larvae like to enter the seedpods and eat the pulp. This attack may cause serious losses if the crop is to be harvested for seed. The control measures for the common asparagus beetle will be effective against adults of this species.

## OUTLOOK FOR INDUSTRY

When a crop that can be grown in many regions and under many conditions proves profitable, the planting of that crop is almost sure to be overdone. Apprehension has been expressed that asparagus has already been overplanted or is in danger of being overplanted. Fanciful reports of acreages and yields in other states and of imminent price collapse, none of which are supported by U. S. Department of Agriculture statistics, have found their way into Illinois and have had their effect in grower-canner relations.

There are reasons, however, why asparagus is not likely to be so seriously overplanted as would be the case if it were an annual plant. First, it is very costly to start a plantation (estimates run from \$85 to \$110 an acre). Furthermore only those who own the land outright or expect to control the use of the land for a long time, have the necessary capital, and can afford to take land out of production for three or four years are justified in starting a plantation.

Nevertheless competition is increasing and will become even more apparent as newer and better-yielding plantations come into bearing. Roughly, competition will be between the Pacific coast states, the Middle Atlantic coast states, and the Middle Western or Mississippi Valley states of which Illinois is the leader in asparagus production.

In this competition Illinois growers will be in a very favorable position, for they have marked advantages in transportation, in the fertility of their soils, in the duration of their plantations, and in the desirable quality of their green asparagus for canning.

Transportation charges from either coast, but especially from the western coast to the Mississippi valley, are high enough to give Illinois asparagus a marked advantage in the Midwest markets.

The cold winters, the gentle spring rains, and the warm summers of Illinois are very favorable for the vigorous development of tender spears in spring and of strong, large stalks in summer and fall.

The natural fertility of Illinois soils gives Illinois growers an advantage that is hard to estimate. Maintenance costs for everything but weed control are very low. Large amounts of manure are available from extensive livestock feeding and from the many big dairies located near good asparagus areas.

Most of the commercial plantings in Illinois have been well planned, and the work has been well done. There is every reason to believe that Illinois asparagus will hold its reputation for high quality. In fact the flavor and texture of Illinois canned green asparagus deserve to be thoroly publicized, for both are excellent.

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**A**SPARAGUS GROWING is a long-time venture. The profit from a plantation over the fifteen or twenty years of its productiveness depends largely on the proper choice of soil and site; the maintenance of the soil in a high state of fertility; the selection of vigorous crowns for planting; and good judgment in harvesting the spears.

Only those who own or are assured of long-time control of the land and can afford to take it out of production for three years should consider establishing a plantation.